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0158/0J974US0

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Chung-Fan CHIOU et al.

Serial No.: 10/021,706

Art Unit: 1743

Filed: November 5, 2001

Examiner: TBA

For: METHOD AND APPARATUS FOR MANUFACTURING BIOCHIP

CLAIMS AS PENDING
AFTER ACCOMPANYING PRELIMINARY AMENDMENT

Hon. Commissioner of
Patents and Trademarks
Washington, DC 20231

Sir:

1. (Amended) An apparatus for manufacturing at least one biochip from at least one
substrate comprising:

a conveying device for moving the substrate through a series of receiving positions; and

a series of dispensers positioned at a series of dispensing positions relative to the series of receiving positions of the conveying device, wherein each of the dispensers has a plurality of nozzles, and each of the nozzles dispenses a predetermined reagent at a predetermined position of the substrate;

wherein each dispenser in the series of dispensers dispenses a plurality of reagents onto the substrate when the substrate is positioned in the corresponding receiving position.

2. The apparatus as claimed in claim 1, wherein the dispensers are separated by a predetermined distance along a first axis defined by the motion of the substrate, and the conveying device moves the substrate the predetermined distance in a step-by-step manner.

3. The apparatus as claimed in claim 2, wherein the series of dispensers are aligned such that the reagents, dispensing from different dispensers, do not overlap.

4. The apparatus as claimed in claim 3, wherein the conveying device comprises:
a base for receiving and supporting the substrate ; and
a plurality of transferring devices, disposed at the base, for moving the substrate from one of the series of dispensing positions to the next in the series of dispensing positions.

5. The apparatus as claimed in claim 4, wherein the conveying device further comprises:

a plurality of positioning devices, disposed on the base, corresponding to the series of dispensing positions; and

a plurality of retainers, disposed on the base, corresponding to the plurality of positioning devices;

wherein each of the positioning devices pushes the substrate into a predetermined position corresponding to dispensing position and the retainers hold the substrate in the predetermined position.

6. The apparatus as claimed in claim 5, wherein the base is provided with a slot, and each of the transferring devices comprises:

a cam rotatably disposed at the base; and

a rod extending through the slot for moving the substrate, wherein the rod is connected to the cam at one end, and abuts the substrate at the other end, wherein the rod moves the substrate by the rotation of the cam.

7. The apparatus as claimed in claim 3, wherein the conveying device comprises:
a plurality of fixtures for receiving and supporting the substrate;

a base for disposing the fixtures thereupon; and

a plurality of transferring devices, disposed at the base, for moving the fixture from one of the series of dispensing positions to the next in the series of dispensing positions.

8. The apparatus as claimed in claim 7, wherein the conveying device further comprises:

a plurality of positioning devices, disposed on the base, corresponding to the series of dispensing positions; and

a plurality of retainers, disposed on the base, corresponding to the plurality of positioning devices;

wherein each of the positioning devices pushes the fixture into a predetermined position corresponding to dispensing position and the retainers hold the fixture in the predetermined position.

9. The apparatus as claimed in claim 8, wherein the base is provided with a slot, and each of the transferring devices comprises:

a cam rotatably disposed at the base; and

a rod extending through the slot for moving the fixture, wherein the rod is connected to the cam at one end, and abuts the fixture at the other end, wherein the rod moves the fixture by the rotation of the cam.

10. The apparatus as claimed in claim 3, further comprising:

a step motor, electrically connected to the conveying device, for moving the conveying device the predetermined distance; and

at least one sensor, for detecting the position of the substrate, electrically connected to the step motor, whereby the movement of the substrate, moving along with the conveying device, depends on the detection of the sensor.

11. The apparatus as claimed in claim 10, wherein the conveying device comprises:
a conveying belt for receiving and supporting the substrate thereupon; and
two rollers, electrically connected to the step motor, for moving the conveying belt.

12. The apparatus as claimed in claim 11, wherein the dispensers are divided into plural groups at the predetermined distance in the first axis, and each group of the dispensers moves in a second axis perpendicular to the first axis.

13. The apparatus as claimed in claim 10, wherein the conveying device comprises:
a rotor electrically connected to the step motor; and
a platform, disposed on the rotor, for the substrate disposing thereupon.

14. The apparatus as claimed in claim 13, wherein the platform is circular shape, and the dispensers are disposed in a ring.

15. (Amended) A method for manufacturing at least one biochip from at least one substrate comprising the steps of:
receiving the substrate on a conveying device;

conveying the substrate through a series of receiving positions corresponding to a series of dispensing positions; and

dispensing a series of reagents onto the substrate at each dispensing position.

16. The method as claimed in claim 15, wherein the series of receiving positions are linearly arranged.

17. The method as claimed in claim 15, wherein the series of receiving positions are arranged in a ring.

18. (Amended) The method as claimed in claim 15, wherein the series of reagents is non-overlapping.

19. The method as claimed in claim 15, wherein a plurality of substrates are received onto the conveying device simultaneously, each of the plurality of substrates being conveyed through the series of receiving positions in a step-by-step manner.

20. (Amended) A method for manufacturing at least one biochip from at least one substrate comprising the steps of:

receiving the substrate on a conveying device;

conveying the substrate through a series of receiving positions corresponding to a series of forming positions; and

forming a series of reagents onto the substrate at each forming position.

21. The method as claimed in claim 20, wherein the series of receiving positions are linearly arranged.

22. The method as claimed in claim 20, wherein the series of receiving positions are arranged in a ring.

23. (Amended) The method as claimed in claim 20, wherein the series of reagents is non-overlapping.

24. The method as claimed in claim 20, wherein a plurality of substrates are received onto the conveying device simultaneously, each of the plurality of substrates being conveyed through the series of receiving positions is a step-by-step manner.

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